

What causes teacher training programs in early education to work?

Evidence from Ghana

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There is increasing evidence of a global “learning crisis” in international education. The World Development Report 2018 identifies three main dimensions of the learning crisis as follows: poor learning outcomes of children, lack of trained and motivated teachers and classroom facilities, and deeper systemic causes characterized by low accountability and high inequality (World Bank, 2018). Other research shows that the learning crisis is in fact a reflection of a teaching crisis (Bold et al, 2017). Consequently, there has been a collective focus on improving teacher training programs around the world.

Currently, there exist many different models of teacher training programs. These range from content-focused programs to those that incorporate active learning, support collaboration, use modeling techniques of effective practices, and provide ongoing support and feedback (Darling-Hammond et al., 2017). However, there is a lot of debate around which model works best. There is no definite answer. Research shows that the effectiveness of different models of training programs varies significantly across contexts and applications. For example, content-focused teacher training programs tend to work well in improving instruction in core subject areas, such as mathematics and reading (Garet et al., 2016). However, other research suggests that programs that focus on delivery of actual teaching practices, especially in the context of early preschool learning, are very effective (Hamre et al., 2017; Abadzi, 2012).

Study

This study builds on an earlier randomized control trial of a short, in-service kindergarten teacher training program in Ghana (Wolf et al., 2018). The training began with a five-day course, followed by a two-day refresher training four months later, and a one-day refresher four months after that. It focused on helping teachers learn age-appropriate play-based instructional techniques that build a positive classroom environment. Overall, the training improved teaching, classroom quality and school readiness of students.

Given the positive impacts of teacher training, this study aims to understand the mechanisms that mediate the causal effect of teacher training on classroom quality. It particularly examines whether teacher knowledge of the learning content, teacher implementation of actual teaching practices and teacher professional well-being mediate the effectiveness of the teacher training program.

The study makes two important contributions. The first contribution is methodological. This study utilizes a causal mediation framework and assess the validity of the estimates through a set of sensitivity analyses. The second contribution is empirical. The study provides empirical estimates of the contribution of different factors that help us understand why some mechanisms work better than others, particularly in early education contexts.

Method

Over time, numerous approaches have been developed to perform mediation analyses. The causal mediation approach assumes that under a set of minimum conditions, the product of coefficient method and its variants yield valid estimates of causal mediation effects (Imai, Keele, & Yamamoto, 2010; Tingley et al, 2014). The minimum conditions are captured by the sequential ignorability assumption, under which the average causal mediation effects are nonparametrically identified. The assumption implies that there may exist unobserved

confounders that causally affect both the mediator and the outcome even after conditioning on the observed treatment and pretreatment covariates. Therefore, assessing the sensitivity of the empirical findings to the possible existence of such confounders is required in order to evaluate the validity of the mediation study. Figure 1 presents the causal mediation framework for this study.

Measures

Teacher knowledge was assessed in three domains: developmentally appropriate practice, social-emotional development and family-supportive practice. Teacher implementation was assessed using a checklist of 15 activities that were explicitly covered in the teacher training related to instructional practice. Each practice was coded as either present (=1) or absent (=0) in recorded videos of teachers teaching a lesson. Teacher professional well-being was measured using self-reported measures of motivation ($\alpha = .77$), job satisfaction ($\alpha = .73$) and burnout ($\alpha = .75$). Classroom quality was measured using three domains of teacher–child interactions: facilitating deeper learning, supporting student expression, and emotional support and behavior management. A small set of covariates was used, including teacher gender, age, level of education, and years of teaching experience to control for teacher related heterogeneity.

Results

Table 1 presents the estimates for the average causal mediation effect (ACME), average direct effect (ADE) and total effect for each of the mediators. Teacher knowledge did not significantly mediate the effect of teacher training on classroom quality. However, the way teachers implemented the teaching practices significantly mediated the effect by 0.13 SD. This accounted to 47.2% of the total effect i.e. teacher implementation positively mediated 47.2% of the total effect of teacher training on classroom quality. Teacher motivation mediated the effect by -0.03 SD. However, the ACME was small and accounted to 12.3% of the total effect i.e. teacher motivation negatively mediated the total effect of teacher training on classroom quality.

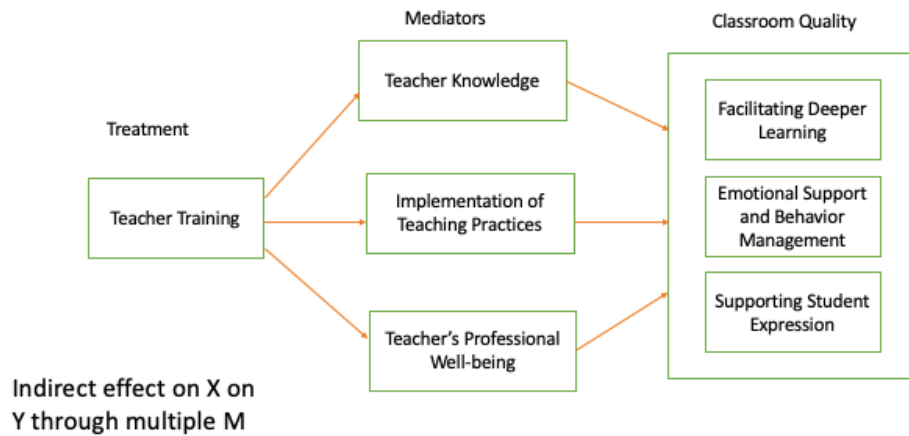
Sensitivity analysis shows that when the original variance explained by the omitted confounders was 13.2%, ACME of implementation became 0. This suggests that the omitted confounders have to explain a reasonably large amount of variation to invalidate the mediation effect of implementation. In contrast, when the original variance explained by omitted confounders was 0.95%, ACME of motivation became 0.

Discussion

Teacher knowledge did not mediate the causal effect of teacher training on classroom quality while implementation of teaching practices positively mediated the causal effect of teacher training on classroom quality by approximately 47%. Perhaps, for teachers in early learning contexts where they are working with young children, it is more important to know how to operationalize the learning activities well in classroom than the knowledge in a specific domain. Research suggests that teacher training programs that actively engage teachers in learning in a way that allows them to change their daily behavior in classrooms tend to impact children's development and learning (Hamre et al., 2015; Desimone & Garet, 2015). It is reasonable to conclude that spending more time and resources in preparing teachers to actively learn early childhood education practices could potentially have lasting impacts on classroom quality and learning development of young children.

References

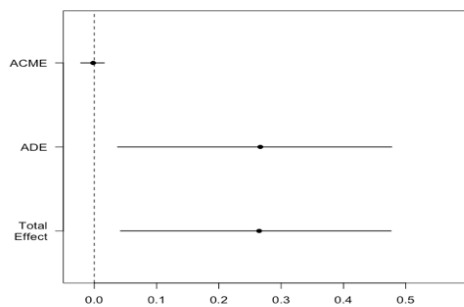
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Figure 1: Causal mediation framework for this study**Table 1:** Estimates for simple mediation.

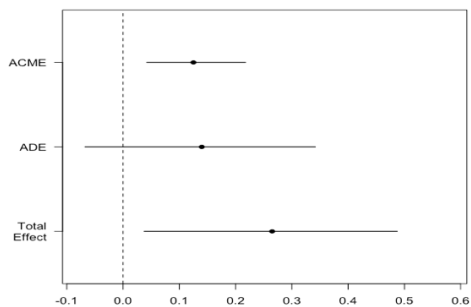
	Estimate	95% CI lower	95% CI upper	p-value	
Knowledge					
ACME	-0.002	-0.022	0.020	0.885	
ADE	0.267	0.038	0.480	0.014	*
Total Effect	0.265	0.042	0.480	0.014	*
Prop. Mediated	-0.007	-0.116	0.110	0.887	
Implementation					
ACME	0.125	0.042	0.220	0.004	**
ADE	0.140	-0.068	0.340	0.206	
Total Effect	0.265	0.038	0.490	0.016	*
Prop. Mediated	0.472	0.145	1.870	0.020	*
Motivation					
ACME	-0.033	-0.068	0.000	0.024	*
ADE	0.297	0.088	0.510	0.006	**
Total Effect	0.265	0.053	0.490	0.010	*
Prop. Mediated	-0.123	-0.686	-0.010	0.034	*
Job Satisfaction					
ACME	0.002	-0.013	0.020	0.860	
ADE	0.263	0.034	0.470	0.030	*
Total Effect	0.265	0.037	0.470	0.030	*
Prop. Mediated	0.007	-0.071	0.100	0.870	
Burnout					
ACME	0.010	-0.017	0.040	0.446	
ADE	0.255	0.041	0.470	0.024	*
Total Effect	0.265	0.055	0.480	0.018	*
Prop. Mediated	0.038	-0.079	0.280	0.444	

Appendix A: Simple Mediation Effects

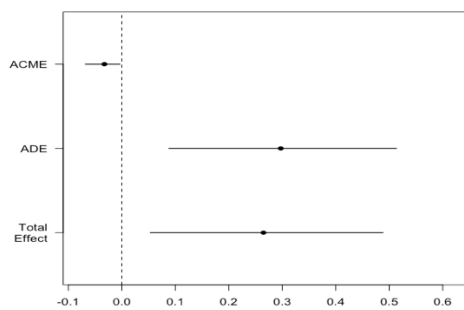
Knowledge



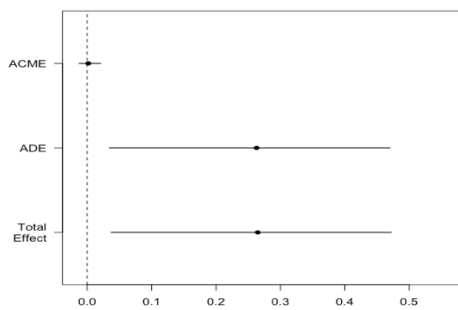
Implementation



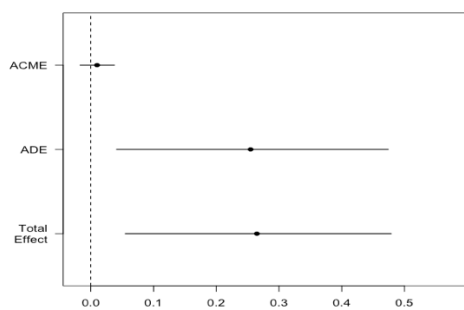
Motivation



Job Satisfaction

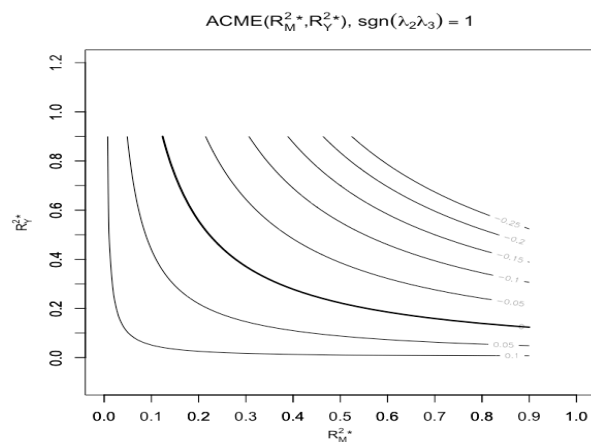
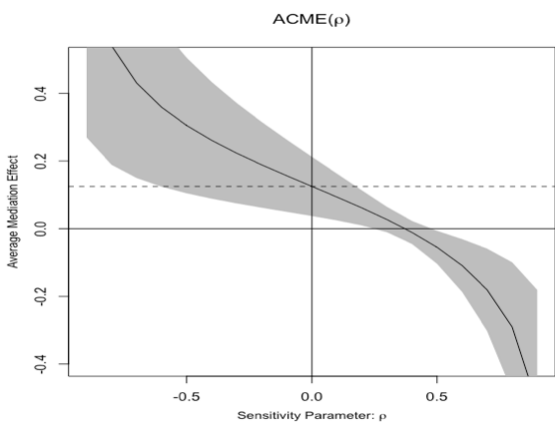


Burnout



Appendix B: Sensitivity Analysis for Simple Mediation

Implementation



Motivation

